

TABLE 1.—Free-air temperatures, relative humidities and vapor pressures during May, 1928—Continued

Altitude M. S. L. (meters)	RELATIVE HUMIDITY (%)									
	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	63	-7	65	+3	44	-16	67	-4	61	-2
250	63	-7	65	+3	44	-16	67	-4	61	-2
500	61	-7	64	+1	43	-17	68	-5	60	-3
750	61	-6	62	-1	39	-20	67	-5	58	-5
1,000	59	-7	62	-1	39	-20	66	-3	57	-6
1,250	55	-9	62	-1	40	-20	64	0	55	-7
1,500	54	-7	63	0	41	-19	55	-4	56	-6
2,000	54	-5	62	+1	43	-17	44	-6	57	-5
2,500	56	0	61	+3	43	-16	38	-8	52	-8
3,000	56	+2	59	+3	42	-15	39	-7	45	-5
3,500	61	+7	54	0	40	-14	42	-3	47	-3
4,000	59	+5	57	+4	39	-13	46	-1	51	+2
4,500	47	-5	62	+9	---	---	46	-2	59	+10
5,000	25	-27	59	+8	---	---	46	-9	---	---

TABLE 1.—Free-air temperatures, relative humidities and vapor pressures during May, 1923—Continued

Altitude M. S. L. (meters)	VAPOR PRESSURE (mb.)									
	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	14.87	-1.55	15.12	+0.07	7.19	-1.96	17.56	-2.03	11.24	-0.69
250	14.72	-1.55	14.86	+0.06	---	---	16.87	-1.96	11.09	-0.67
500	12.99	-1.33	12.94	-0.13	6.90	-2.00	15.07	-2.01	9.51	-0.62
750	11.76	-1.14	11.59	-0.27	6.01	-1.85	13.53	-1.94	8.42	-0.64
1,000	10.65	-1.15	10.62	-0.21	5.40	-1.73	12.40	-1.34	7.61	-0.63
1,250	9.52	-1.05	9.56	-0.33	4.95	-1.60	11.01	-0.89	6.81	-0.61
1,500	8.53	-0.78	8.87	-0.14	4.62	-1.36	9.05	-1.09	6.27	-0.40
2,000	7.22	-0.22	7.15	0.00	3.88	-0.99	6.27	-1.14	5.21	-0.01
2,500	6.10	+0.30	5.82	+0.17	3.13	-0.74	4.66	-1.10	3.85	0.00
3,000	4.96	+0.37	4.41	+0.01	2.31	-0.71	3.87	-0.86	2.78	-0.02
3,500	4.27	+0.53	3.26	-0.21	1.57	-0.75	3.24	-0.54	2.37	-0.19
4,000	3.61	+0.57	2.86	+0.10	0.51	-1.23	2.89	-0.23	2.10	-0.48
4,500	2.41	+0.02	2.39	+0.23	---	---	2.65	-0.07	2.23	+0.83
5,000	1.33	-0.71	1.80	+0.11	---	---	2.45	-0.26	---	---

TABLE 2.—Free-air resultant winds (m. p. s.) during May, 1928

Altitude m. s. l. (meters)	Broken Arrow, Okla. (233 meters)				Due West, S. C. (217 meters)				Ellendale, N. Dak. (444 meters)				Groesbeck, Tex. (141 meters)				Royal Center, Ind. (225 meters)				Washington, D. C. (34 meters)			
	Mean		Normal		Mean		Normal		Mean		Normal		Mean		Normal		Mean		Normal		Mean		Normal	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 22 E.	2.2	S. 8 E.	2.1	N. 70 W.	0.4	S. 83 W.	0.9	N. 11 E.	1.0	N. 8 E.	0.7	S. 18 W.	2.0	S. 5 E.	2.4	N. 61 W.	0.5	S. 76 W.	0.4	N. 34 W.	0.7	N. 43 W.	0.6
250	S. 22 E.	2.2	S. 8 E.	2.2	N. 65 W.	0.5	S. 78 W.	1.0	N. 62 W.	0.6	S. 45 E.	0.5	S. 22 W.	2.6	S. 4 E.	3.0	N. 58 W.	0.9	S. 78 W.	0.5	N. 23 W.	2.7	N. 64 W.	1.8
500	S. 18 E.	2.6	S. 8 E.	2.9	N. 87 W.	1.0	S. 84 W.	1.8	N. 7 E.	0.9	N. 11 E.	0.5	S. 25 W.	3.3	S. 1 W.	4.1	N. 81 W.	1.5	S. 61 W.	1.5	N. 19 W.	3.4	N. 68 W.	2.7
750	S. 16 E.	2.9	S. 5 W.	3.3	N. 80 W.	1.5	S. 83 W.	2.6	N. 62 W.	0.6	S. 45 E.	0.1	S. 33 W.	3.3	S. 9 W.	4.8	S. 88 W.	2.2	S. 71 W.	2.1	N. 14 W.	3.9	N. 66 W.	3.5
1,000	S. 4 W.	2.9	S. 21 W.	3.5	N. 83 W.	2.0	S. 84 W.	3.1	N. 54 W.	1.0	S. 18 W.	0.3	S. 39 W.	3.5	S. 20 W.	5.1	N. 80 W.	3.4	S. 82 W.	2.8	N. 19 W.	4.8	N. 66 W.	4.1
1,250	S. 7 W.	3.1	S. 33 W.	3.8	S. 83 W.	2.5	S. 82 W.	4.1	N. 63 W.	1.4	S. 39 W.	0.8	S. 46 W.	3.2	S. 27 W.	5.3	N. 68 W.	5.1	N. 38 W.	3.6	---	---	---	---
1,500	S. 36 W.	2.8	S. 46 W.	4.0	N. 88 W.	2.7	S. 79 W.	5.1	N. 60 W.	2.2	S. 52 W.	1.1	S. 45 W.	3.1	S. 35 W.	4.8	N. 64 W.	5.6	W.	4.0	N. 39 W.	5.5	N. 64 W.	5.5
2,000	S. 60 W.	3.2	S. 62 W.	4.5	W.	5.4	S. 81 W.	6.6	N. 62 W.	2.8	S. 70 W.	2.4	S. 65 W.	2.9	S. 47 W.	4.7	N. 59 W.	6.2	N. 89 W.	6.2	N. 60 W.	6.6	N. 70 W.	6.8
2,500	S. 81 W.	3.8	S. 78 W.	5.5	S. 83 W.	7.7	S. 81 W.	8.8	N. 62 W.	5.8	S. 72 W.	3.9	S. 76 W.	3.3	S. 60 W.	4.9	N. 69 W.	8.4	S. 85 W.	6.6	N. 55 W.	8.5	N. 69 W.	7.2
3,000	S. 88 W.	4.3	W.	6.0	S. 88 W.	11.4	S. 86 W.	9.2	N. 55 W.	9.4	S. 70 W.	5.5	S. 80 W.	4.4	S. 74 W.	5.8	N. 76 W.	9.6	S. 78 W.	8.4	N. 61 W.	10.2	N. 73 W.	7.6
3,500	N. 67 W.	4.3	N. 84 W.	7.2	S. 89 W.	10.0	N. 88 W.	10.0	N. 51 W.	9.4	S. 84 W.	6.3	S. 83 W.	4.3	S. 85 W.	7.0	N. 70 W.	10.8	N. 74 W.	8.7	N. 61 W.	10.6	N. 65 W.	7.6
4,000	N. 17 W.	6.9	N. 77 W.	7.7	N. 85 W.	10.0	N. 75 W.	11.3	N. 54 W.	9.2	N. 88 W.	8.1	N. 63 W.	7.3	N. 75 W.	9.7	N. 45 W.	9.1	S. 75 W.	8.6	---	---	---	---
4,500	N. 22 W.	10.8	N. 69 W.	8.8	N. 86 W.	9.6	N. 76 W.	10.0	---	---	---	---	N. 25 W.	9.3	N. 59 W.	9.1	N. 36 W.	10.7	N. 69 W.	10.9	---	---	---	---
5,000	N. 22 W.	11.4	N. 66 W.	6.5	W.	5.0	N. 81 W.	11.5	---	---	---	---	N.	8.0	N. 89 W.	6.6	N. 15 W.	7.3	N. 71 W.	11.7	---	---	---	---

## THE WEATHER IN THE UNITED STATES

## THE WEATHER ELEMENTS

By P. C. DAY

## GENERAL CONDITIONS

The month was notably free from extensive or widespread short-period variations, being almost continually warm in the western two-thirds and largely cool in the eastern third, with an important deficiency in precipitation over many districts. The weather on the whole was favorable for outdoor occupations but too cool for best crop development in the Eastern and Southeastern States.

## PRESSURE AND WINDS

The pressure distribution was somewhat of the anticyclonic type, the area of highest pressure, slightly above 30 inches, being central over the far Northwest, a ridge extending southeastward to the Florida Peninsula, the averages diminishing slightly to the southwestward, but with little if any change northward toward the Canadian Provinces. This type of pressure was rather persistent during the first half of the month and no

cyclones attended by precipitation of importance occurred during that period, though local precipitation, heavy in a few instances, occurred on the 4th and 5th from the southern plains northeastward to the Great Lakes, and again on the 7th and 8th along the Atlantic coast from northern Florida to southern New England, and local showers were quite frequent during the early part of the second decade from the southern Plateau eastward to the plains of Texas, Oklahoma, and Kansas.

By the 15th the general rainy conditions in the Southwest had developed into a considerable barometric depression over the middle plains, which advanced eastward into the central valleys and to the Great Lakes by the 17th. This was attended by showers with local heavy thunderstorms over the region covered and for the following few days showers occurred over wide areas from the Great Plains eastward.

About the 22d, conditions favoring thunderstorms overspread the central Gulf States and during the following few days some heavy rains occurred over the Southeastern States. These were quickly followed by a stormy condition central on the morning of the 25th near the lower Lakes, which, advancing southeastward over

the southern Appalachian Mountains and to the middle Atlantic coast, brought mostly light showers to much of this territory, the showers continuing until near the end of the month over a large portion of the Atlantic coast area.

In the more western portions the precipitation was mainly light and May as a whole was the driest month of its name in large areas of the far Northwest.

The anticyclones were mainly not strong and while unfavorable to the passage of important cyclones over the interior districts, yet of themselves produced no marked or sudden changes in temperature or other weather conditions.

The general distribution of the average pressure and its influence on the wind circulation are shown on Chart VI, and the departures from the normal for the month and changes as compared with the preceding month are shown on the insets of Charts II and III.

A table showing the more important wind or other damaging storms appears at the end of the section. This shows that they were confined principally to the area from the Great Plains eastward and were most numerous during the early part of the first decade, during the middle and latter parts of the second decade, and were reported in nearly all parts of the last decade.

Much damage from hail was reported and while a considerable number of tornadoes occurred they were mainly without great property damage or loss to human life.

#### TEMPERATURE

The day-to-day changes in temperature were mainly small, only in a few instances reaching as much as 20° in a period of 24 hours, and these were confined chiefly to the first week and to the districts from the lower Lakes and Ohio Valley eastward in connection with some unusually warm days about the 3d to 6th, quickly followed by the lowest temperatures of the month in portions of the area.

The first week as a whole was mainly subnormal as to temperature, though to a materially less degree than had been the case for a considerable period previously, and opportunity was afforded for vegetation to make considerable advancement already much delayed by unfavorable weather.

The second week continued rather cool over most southern and eastern districts, particularly so in the middle Atlantic coast area, but from the upper Mississippi Valley westward and over the Pacific coast this week was distinctly warm and favorable for vegetation.

From the 15th to 22d temperature conditions were mainly moderate, though it continued warmer than normal over the Pacific coast and Northwest, and was slightly warmer over many other districts.

The last week continued notably warm in the districts from the Rocky Mountains westward and was moderately warm in the Great Plains, but to the eastward cool weather continued, particularly in the Ohio Valley and near-by areas, the weekly averages ranging from 6° to 9° below the normal, and the growth and development of warm-weather crops was further retarded. In the far West this period was the warmest of the month, the weekly averages ranging up to 10° or 12° above the normal, and vegetation made rapid progress, particularly in the irrigated districts.

For the month as a whole there were wide differences in the temperature conditions. From the western Lake region and Mississippi River westward, except in southern Texas, temperatures for the month were above the normal, and decidedly so in the far Northwest, stations in Idaho and portions of near-by States having means in

some cases higher than ever before recorded in May. At the same time average temperatures were as low as or lower than ever before recorded in May in some southeastern districts, notably at Jacksonville, Fla.

The highest temperatures of the month occurred early in the first decade from the Ohio Valley and Great Lakes eastward, but over the remaining districts they occurred mainly during the last few days. The highest reported was 116° in southern California, and the maximum readings were as high or higher than had occurred previously in May in portions of the far Northwest.

In the districts from the Rocky Mountains westward the lowest temperatures occurred mainly during the first few days, in the Gulf States about the 5th to 10th, extending over the more northern districts into the first half of the second decade. No unusually low temperatures were recorded and no serious frost damage resulted over important crop areas.

#### PRECIPITATION

As stated elsewhere, the month as a whole was decidedly lacking in the amount of precipitation that may usually be expected in May. Only 8 sections out of the total of 42 had amounts in excess of the normal, these embracing four in the Southeast and four in the southern Rocky Mountain and plateau regions. Elsewhere deficiencies were the rule, these being well marked from the middle Plains eastward and in the far Northwest. No important sections suffered greatly from this general lack of precipitation, however, as the soil was mainly well supplied with moisture during the early part from the general excess that occurred during April, while during the latter part precipitation was more favorably distributed though still usually less than normal. In portions of the far Northwest the month was the driest May of record.

Over most districts where drought existed at the end of April, relief came during May. This was notably the case in southern Florida where one of the severest droughts of record was partly relieved about the 21st to 23d and generally terminated by the end of the month.

#### SNOWFALL

No snow of importance fell save in the mountain districts of the West, notably in the elevated districts of Colorado where at a few points monthly amounts up to 30 inches were reported, while in the high Sierra of California amounts up to 18 inches occurred. On account of the continued warmth over the western mountains much of the snow at higher elevations was melted and the prospective late summer flow will be greatly reduced, particularly in the far Northwest.

#### RELATIVE HUMIDITY

The month was notably dry as measured by the percentages of relative humidity, which were below normal in all parts save locally in the middle Rocky Mountains and portions of the far Southwest and at a few points in the Appalachian Mountains and Northeast. It was notably dry on a number of days in the upper Mississippi Valley and portions of the Lake region, and the departures from normal were large over the Central Valleys, Lake region, and Northwest.

#### SPECIAL PHENOMENA

An unusually brilliant meteor was observed about midnight of the 22d-23d over an extensive area from southwestern Georgia to the coast of South Carolina. It seemingly exploded, causing vibrations sufficient to be mistaken for an earthquake.